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ABSTRACT

The purpose of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a dropout retrieval program. A nonrandomized pretest-posttest experimental design was used to compare students from urban settings in two groups. Students in the experimental group participated in 12 weeks (60 sessions), 50 minutes per day, of Individualized Manpower Training System (IMTS) instruction plus a 10-minute daily period of computer assisted instruction (CAI) in mathematics. The only difference between the experimental and control groups was that the experimental group received 10 minutes of CAI in mathematics daily and the control group received 10 minutes of IMTS instruction in mathematics daily. Analysis of covariance indicated no significant difference on any dependent variable for type of instruction and the interaction between sex and type of instruction. The IMTS program with or without CAI had a more significant impact, by t-test, on males' academic self-concept and locus of control. (Author)

EFFECTS OF A COMPUTER ASSISTED REMEDIATION PROGRAM ON BASIC SKILLS MATHEMATICS ACHIEVEMENT, ACADEMIC SELF-CONCEPT, AND LOCUS OF CONTROL OF STUDENTS IN A SELECTED DROPOUT RETRIEVAL PROGRAM IN AN URBAN SETTING

BY

GARY L. REGLIN

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

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1988

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The purpose of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a dropout retrieval program in an urban setting. A nonrandomized pretest-posttest experimental design was used to compare students in the two groups. Students in the experimental group participated in 12 weeks (60 sessions), 50 minutes per day, of Individualized Manpower Training System (IMTS) instruction plus a 10-minute daily period of computer assisted instruction (CAI) in mathematics. Students in the control group participated in 12 weeks (60 sessions), 60 minutes per day, of IMTS instruction with the last 10 minutes being IMTS instruction in mathematics. The only difference between the experimental and control groups was that the experimental

group received 10 minutes of CAI in mathematics daily and the control group received 10 minutes of IMTS instruction in mathematics daily.

The statistical techniques used were the *t* test and a two-way analysis of covariance. A *t* test was used to determine if significant ($p < .05$) changes occurred in basic skills mathematics, academic self-concept, and locus of control from the pretest to the posttest with regard to the type of treatment given. A two-way analysis of covariance was used to determine differences in adjusted posttest scores using the pretest scores as the covariate. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction. Analysis of covariance (ANCOVA) indicated no significant difference on any dependent variable for type of instruction and the interaction between sex and type of instruction. However, there was a significant difference with regard to sex for academic self-concept ($F = 4.17$, $p < .05$) and locus of control ($F = 15.17$, $p < .0002$). The IMTS program with or without computer assisted instruction had a more significant impact on males' academic self-concept and locus of control.

CHAPTER I
INTRODUCTION

There has been a growing concern in recent years over the number of students who leave school prior to high school graduation; school dropouts are considered a waste of human resources. The high school dropout rate has been especially high in Florida. Florida's 1986 rate of 38.8% remained higher than all but one state (Sadowski, 1987).

The leaders of the Duval County Public School System in Florida have implemented vocational skills centers with a full-time vocational training program (FTVTP) as an intervention measure to combat the high school dropout problem. The FTVTP was a program for high school dropouts (16-19 years of age) who reenter the public school system in a vocational program for at least 4 hours per day plus 1 hour per day in an academic remediation component (Duval Public Schools, 1987). This component was an individualized study program designed to remediate educationally disadvantaged students in the basic skills to improve their chances of succeeding in the chosen vocational program (Fennell, 1986).

A good foundation in basic skills mathematics is an important factor in students succeeding in vocational programs. The use of meta-analysis techniques revealed that computer assisted instruction (CAI) increased secondary school students' mathematics achievement

from .33 to .45 standard deviations (Burns & Bozeman, 1981; Kulik, Bangert, & Williams, 1983). In addition CAI improved students' attitudes toward mathematics and computers (Mevarech & Rich, 1985).

Additional factors contributing to success in vocational programs would be improved academic self-concepts and locus of control. Felker, Stanwyck, and Kay (1973) developed and implemented a teacher program, the primary focus of which was to enhance self-concept. These researchers confirmed that self-concept can be changed by increasing the self-rewarding behavior of students and it also supported the claim that self-concepts can be changed in the short-term, in this case 12 weeks. Findings reported in a study by Kifer (1975) indicate that differences in academic self-concept are brought about by interactions with the educational environment. These findings tend to support the idea that different teaching styles, modes of instruction, motivational factors, and types of feedback can have an effect on students' academic self-concept which, of course, also may affect academic achievement.

Researchers have also suggested that while leaders have the responsibility to develop more positive academic self-concepts in students, they also should assume the responsibility to develop individuals who believe that they control their own destinies, at least to some degree. Rotter (1966) conceptualized this belief and developed a theory of internal-external locus of control. Rotter defined locus of control as a person's perception of the degree to which his or her rewards follow from, or are contingent upon, his or her own behavior or attributes versus the degree to which he or she

feels rewards are controlled by forces outside of himself or herself (Rotter, 1966). Researchers have demonstrated that locus of control is subject to modification by manipulating the environment (Ayabe & Nitahara-Pang, 1981). Therefore, locus of control is another affective trait to be nurtured by providing an appropriately supportive educational environment.

Researchers demonstrated that improved academic self-concepts and locus of control contribute to the cognitive and affective development of students, but evaluators of the Duval County program did not address the effects of computer assisted remediation programs on the basic skills mathematics achievement, academic self-concept, and locus of control of students in a full-time vocational training program.

Background of the Problem

Since many factors within the educational environment contribute to the FTVTP student's definition of himself or herself, the teacher, being the source of encouragement, condemnation, smiles, and frowns, emerges as a central influence in the development of self-concept and feelings about locus of control. Ginott (1972) has written: "I have come to the frightening conclusion that I am the decisive element in the classroom. I possess tremendous power to make a child's life miserable or joyous" (pp. 15-16).

The introduction of increasingly more computers in remediation programs for high school dropouts may have an effect similar to that which the teacher has on academic self-concept and locus of control. Students are spending an increasing percentage of classroom time interacting with the computer rather than the teacher.

Within the past decade, research in the area of computer assisted instruction has shown the effects of this method on achievement and attitudes (Mevarech, Stern, & Levita, 1987). Kulik, Bangert, and Williams (1983) reported that 39 out of 48 studies pointed toward the superiority of CAI programs over traditional instruction; their meta-analysis indicated that CAI students scored .32 standard deviations higher on achievement than non-CAI students. Mevarech and Rich (1985) found that students who participated in a CAI mathematics program rated themselves significantly higher on self-concept in mathematics achievement than students exposed to the same materials in a traditional instructional setting. Hunt (1983) found that the increase in mathematics achievement was associated with higher levels of academic self-concept, more responsibility for success or failure, and more favorable perceptions of the quality of school life.

People attribute the consequence of an event to either internal or external forces (Crandall, Katkovsky, & Crandall, 1965). In school, students with an internal orientation believe that the outcomes depend on their ability and effort. Alternately, externals, who perceive they have no control over the situation, attribute the results to task difficulty or luck. Attribution theorists (e.g., Weiner, 1976) readily suggest that educational environments that encourage students' responsibility increase internal orientation to a greater extent than traditional instruction in which the teacher is responsible for learning.

The above findings raise the question of the extent to which CAI affects locus of control. Does it make the FTVTP students feel they

have equal opportunities to learn and that the degree of success is within their control? Or does it develop dependency on the computer for checking responses and making decisions concerning their learning experiences?

The researcher believed that an investigation such as the one reported herein would contribute to the knowledge in this essential area of inquiry. Such a study would enable determination of the effectiveness of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of FTVTP students. The outcomes should provide needed information regarding the potency of participating in a computer assisted remediation program and insight into the variables believed to underlie the educational success of FTVTP students.

Statement of the Problem

The problem of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a dropout retrieval program in an urban setting. In addition, the adjusted posttest scores in basic skills mathematics, academic self-concept, and locus of control between males and females were explored with regard to type of instruction.

The specific research questions addressed in the study were as follows:

1. Is there a significant difference ($p < .05$) between the pre- and postexperiment mathematics scores for (a) FTVTP students who received computer assisted instruction as a part of their

Individualized Manpower Training System (IMTS) instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

2. Are the adjusted posttest scores of the FTVTP students in basic skills mathematics significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

3. Is there a significant difference ($p < .05$) between the pre- and postexperiment academic self-concept scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

4. Are the adjusted posttest scores of the FTVTP students in academic self-concept significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

5. Is there a significant difference ($p < .05$) between the pre- and postexperiment locus of control scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

6. Are the adjusted posttest scores of the FTVTP students in locus of control significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

Importance of the Study

Relatively little was known about the basic skills remediation of students in the Duval County full-time vocational training program and the effects that CAI would have on the self-concept and locus of control of the students in various programs such as the Individualized Manpower Training System (IMTS). Dropouts have a difficult time coping with the academics in high school. If significant differences in self-concept and locus of control were found, then this would be a solid foundation to argue for increased funding for microcomputers in the academic component of the FTVTP. The students have had a difficult time increasing their basic skills mathematics using traditional instruction. They have become so frustrated because of the inability to master such vocational programs as electronics and drafting that they often quit the FTVTP and become a burden on taxpayers.

Jordan-Davis (1984) interviewed 95 students to find out why they left school. Responses showed that no one reason could be responsible. It seemed that both social and academic variables "came into play"; however, school-related issues were mentioned more frequently. The most common social/personal reasons for dropping out were as follows: pregnancy, wanting to work full-time, and having to work full-time.

Many of the FTVTP students have come into the vocational skills centers with behavioral problems. Many of the behavioral problems have included loud talking and unauthorized noisy movements. Many of these behaviors are considered normal and appropriate outside the

classroom. Even in the classroom they have not been prohibited because they are inherently "bad," but because they detract from the teaching-learning process (Autry & Langenbach, 1985).

Teachers are forced to contend with these problems but their methods of doing this are sometimes ineffective and negative and may actually exacerbate the problem. A more effective means of changing behavior involves helping FTVTP students assume self-responsibility for their own behavior. Both social learning theory and attribution theory have significant implications for this process.

A small number of the academic remediation components at vocational skills centers has been supplemented by CAI. This trend will change if more high school dropouts are diverted into vocational skills centers and the success of the computer remediated study programs becomes more evident. The purpose of this research investigation, therefore, was to determine the selected effects of a computerized remediation program on students in a full-time vocational training program. Variables selected were achievement in the basic skills mathematics, academic self-concept, and locus of control.

Research studies such as the present one should provide information that could influence decisions to obtain more microcomputers for the remediation of FTVTP students. Many FTVTP students have been unsuccessful in their chosen vocational program because of deficiencies in basic skills mathematics. Computer assisted instruction can be very helpful in this type of situation. No research study has been completed on the effects of a computerized

remediation program on the basic skills mathematics, academic self-concept, and locus of control of FTVTP students.

Leaders of a highly successful IMTS program in Duval County acquired 12 microcomputers to supplement the IMTS instruction for approximately 120 FTVTP students during 1987. With the acquisition of the computers, attendance, achievement in the basic skills, and many discipline problems improved. This IMTS program evolved from an average program to the model program in the state. In 1987, Florida Governor Martinez visited the program and presented numerous awards to the IMTS managers and students. The accolades were for increased achievement in the basic skills, increased attendance, reduction of disciplinary problems, and several additional categories relating to the full-time vocational training program. Students' use of computer assisted instruction with the Individual Manpower Training System instruction had a very positive effect in eliminating many problems the students brought with them to the IMTS Laboratory. In 1988 efforts were in progress at the district and school levels to acquire additional funding from state sources to purchase more computers and to perhaps expand the use of computer assisted instruction in all remedial programs associated with high school dropouts. This study was seen as contributing significantly to those efforts.

This study should help educational leaders and teachers augment the achievement of FTVTP students in a remediation program. A survey of teachers concerning dropouts showed that dropouts lacked initiative, had attendance problems, had poor study habits, were distinterested and irresponsible, and had too many home problems

(Rumberger, 1983). The FTVTP students have come into the remediation laboratory with the above problems, which hinder learning.

Also, this study was important because documented evidence revealed that computer assisted remediated programs improve students' mathematics achievement, academic self-concept, and locus of control (Hunt, 1983). The result should show that CAI develops more internally directed students who are more able to live up to the expectations they have for themselves. Because of this, educational leaders should see increased learning in remediation programs.

Definition of Terms

The following definitions were used in this study:

Academic self-concept (performance-based) is defined as a student's self-confidence in his or her academic abilities and feelings about school performance (Dolan, Enos, Wicki, & Smith, 1980).

Academic self-concept (reference-based) is defined as the way students think other people (teachers, family, friends) feel about the student's school performance and ability to succeed (Dolan et al., 1980).

Attribution theory is the investigation of the perception of causality, the judgment of why a particular incident occurred (Autry & Langenbach, 1985).

Computer assisted instruction (CAI) group is defined as FTVTP students in an experimental program who participated in 12 weeks (60 sessions), 50 minutes per day, of IMTS instruction plus a 10-minute daily period of CAI in mathematics.

Educationally disadvantaged students are those students (other than classified handicapped students) who, due to inadequate educational preparation, lack academic competence--particularly in reading, writing, or mathematics--which is reflected in a gap of at least 1 year below grade level for that age (Fennell, 1986).

External locus of control is the perception that a specific reinforcement which follows a person's actions is independent of the person's own behavior or characteristics (Rotter, 1966).

Global self-concept is defined as the description an individual makes with regard to himself or herself. It is the totality of perceptions one has of himself or herself as a consequence of interactions with the environment and significant others (Mboya, 1984).

Individualized Manpower Training System is an instructional program designed to support academically disadvantaged students whose basic skills deficiencies hinder success in vocational preparatory programs. The Individualized Manpower Training System provides for assessment of learning deficiencies followed by individualized prescriptive instruction and guidance for students who need special assistance in order to succeed in vocational preparatory programs. The program is characterized by an open entry/open exit, self-paced instructional modules, flexible schedules, performance based evaluation, and a nongraded system (Fennell, 1986).

Internal locus of control is the perception that a specific reinforcement which follows a person's actions is contingent upon the person's own behavior or characteristics (Rotter, 1966).

Locus of control is defined as a person's interpretation of his or her origin of reinforcement. A person having an internal locus of control perceives the reinforcement as dependent upon his or her own behavior. The person having an external locus of control, however, contends that the reinforcement is a result of luck, fate, or the influence of more powerful others (Rotter, 1966).

Noncomputer assisted instruction (non-CAI) group is defined as FTVTP students in a control program who participated in 12 weeks (60 sessions), 60 minutes per day, of IMTS instruction with the last 10 minutes being IMTS instruction in mathematics. The only difference between the CAI group and the non-CAI group is that the CAI group received 10 minutes of CAI instruction in mathematics daily and the non-CAI group received 10 minutes of IMTS instruction in mathematics daily.

Social learning theory is a theory that can be used to explain the person's selection of specific responses from a larger repertoire in predicting behavior in social settings (Autry & Langenbach, 1985).

Research Design

The research design used was the nonrandomized pretest-posttest experimental group design. The dependent variables studied were basic skills mathematics, academic self-concept, and locus of control test scores. The independent variables studied were type of instruction and sex of the subjects.

Eighty-four full-time vocational training program students, 16-19 years of age, in the IMTS Laboratory at Northside Skills Center,

Jacksonville, Florida, were randomly assigned to an experimental group and a control group. The FTVTP students were given three pretests: the Test of Adult Basic Education (TABE) (TABE, Technical Report, 1978), Self-Concept of Academic Ability Scale (SCAA) (Brookover, LePere, Hamachek, Thomas, & Erickson, 1965), and the Norwicki-Strickland Personal Reaction Survey (Norwicki & Strickland, 1972). Following administration of the instruments, the students in the control group participated in 12 weeks (60 sessions), 60 minutes per day, of IMTS instruction with the last 10 minutes being IMTS instruction in mathematics. The students in the experimental group participated in 12 weeks (60 sessions), 50 minutes per day, of IMTS instruction plus a 10-minute daily period of CAI in mathematics. The only difference between the groups was that the experimental group received 10 minutes of CAI in mathematics daily and the control group received 10 minutes of IMTS instruction in mathematics daily. The researcher, an IMTS teacher, and an IMTS aide were the only persons working with both groups of students. Upon termination of the 12-week instructional period, students received posttests on measures of basic skills math, academic self-concept, and locus of control.

The statistical techniques used to analyze the data were the _t_ test and a two-way analysis of covariance. A _t_ test was used to determine if significant changes occurred in basic skills mathematics, academic self-concept, and locus of control from the pretest to the posttest with regard to the type of treatment given. A two-way

analysis of covariance was used to determine differences in adjusted posttest scores using the pretest scores as the covariate. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction.

The analysis of covariance is used to adjust for possible differences on the input variables (pretests) and was used because it is a powerful statistical tool which is likely to pick up significant differences between groups (Huck, Cormier, & Bounds, 1974).

Written permission to conduct the experiment was obtained from the principal of the vocational skills center and the district. Written permission was also obtained from parents of the students who participated in the study (see Appendices A and B).

Population and Sample

The population of this study consisted of full-time vocational training program students in the Individualized Manpower Training System laboratory at Northside Skills Center of the Duval County Public Schools. Duval County is located in the northeastern part of Florida.

The sample consisted of 84 students whose parents agreed to permit them to participate. Securing parental permission was required by the district as a condition for the student participation in the research study. A random assignment of students using the CRC Handbook of Table for Probability and Statistics (Beyer, 1987) was made. Ages of the subjects ranged from 16.0-19.0 with a mean age of 17.4. As determined from demographic information, males comprised

67.9% (57) of the subjects. White American male students accounted for 20.2% (17) of the sample and Black American male students constituted 47.6% (40) of the total group. Females constituted 32.1% (27) of the total group of subjects. Of the total sample, 11.9% (10) were white American females and 20.2% (17) were Black Americans. A combined grouping of males and females showed that white Americans formed 32.1% (27) of the total group with Black Americans comprising 67.9% (57) of the total group. One Black female and 7 Black males dropped out of the program and could not be posttested. The female was in the control group. Three of the males were in the control group and 4 were in the experimental group.

Instrumentation

The dependent variables in this study were basic skills mathematics, academic self-concept, and locus of control. The instruments used for data collection were the Test of Adult Basic Education (TABE), Self-Concept of Academic Ability Scale (SCAA), and the Norwicki-Strickland Personal Reaction Survey. In conjunction with each instrument, demographic information was also provided by each participant in the study.

Basic Skills Mathematics

Basic skills mathematics was measured by the Test of Adult Basic Education, Level D mathematics skills (TABE, Technical Report, 1978). The TABE can be used to provide preinstructional information about a student's level of achievement in the basic skills of reading, mathematics, and language; to identify areas of weakness in these skills; to measure growth in the skills after instruction; to involve

the student in appraisal of his or her learning difficulties; and to assist the teacher in preparing an instructional program to meet the student's individual needs (TABE, Examiner's Manual, 1976).

The Level D mathematics test contains 135 problems and requires about 115 minutes to administer. Reliability estimates for the TABE typically should run in the .80s or possible the low .90s (TABE, Technical Report, 1978). The same-form and alternate-form test-retest reliabilities averaged around .75 to .80.

Academic Self-Concept

Self-concept of academic ability was measured by the Self-Concept of Academic Ability Scale (SCAA) (Brookover et al., 1965). Brookover et al. indicated that self-concept of academic ability refers to behavior in which one indicates to himself or herself (publicly or privately) his or her ability to achieve in academic tasks as compared with others engaged in the same tasks. Self-concept of ability can be characterized as one of the many concepts of self; hierarchical in nature; dependent on a particular role, area of experience, situation, time, etc.; relatively stable under similar stimulus situations; and primarily evaluative in nature.

The SCAA-General Scale (Form A) consists of eight items, selected to differentiate students on achievement, which form a Guttman scale (reproducibility coefficient = 0.91). The items are self-evaluative questions about academic ability such as "What kind of grades do you think you are capable of getting?" There are five response alternatives ranging from "Mostly A's" to "Mostly E's." The eight items are divided into two conceptual dimensions, each composed of two

logical subsets: (a) future-oriented and present-oriented items and (b) comparative and absolute evaluations of ability.

For samples of subjects drawn from grades 7 to 10, internal consistency reliability of Form A ranged from .82 to .92 for boys and from .77 to .84 for girls (Brookover et al., 1965). Test-retest reliability coefficients, reported for 1-year intervals, ranged from .82 to .92 for boys and from .77 to .84 for girls.

Locus of Control

Locus of control was measured by the Norwicki-Strickland Personal Reaction Survey (Norwicki & Strickland, 1972) for children and adolescents (ages 9 to 18) which was based on Rotter's (1966) construct of locus of control reinforcement. The construct ranges from internal to external locus of control and was described by Rotter as a generalized expectancy related to an individual's belief that the reinforcement received was a function of a person's own action or characteristics. External locus of control at the other extreme was generated by a belief that reinforcements received are the result of external agents including such examples as fate, chance, luck, and powerful other persons (Rotter, 1966).

The Norwicki-Strickland Personal Reaction Survey was designed in 1969 and consists of 21 questions which are answered "yes" or "no." The items sample a variety of situations. Norwicki and Strickland (1972) reported that reliability estimates are satisfactory at all grade levels tested (_n_ = 1732, grades 3-12) with test-retest reliabilities from .67 to .79. All socioeconomic areas were included

in the original sample and all subjects had intelligence test scores that fell within the average classification range.

Internal consistency (Spearman-Brown split half) was reported by Norwicki and Strickland (1972) through groupings of grade levels and were

1. r = .63 for grades 3, 4, and 5;
2. r = .68 for grades 6, 7, and 8;
3. r = .74 for grades 9, 10, and 11; and
4. r = .81 for grade 12.

The score is the total number of items answered in an externally controlled direction. Therefore, a higher score indicates more externality and a lower score indicates more internality.

Experimental Procedures

Data for this study came from the Test of Adult Basic Education, Self-Concept of Academic Ability Scale, and the Norwicki-Strickland Personal Reaction Survey. All information used for treatment concerned a group of 84 who were enrolled in the FTVTP program (IMTS laboratory) at the Northside Skills Center during the months of January, February, and March. Testing was conducted under strict controlled conditions. All testing was completed by the researcher.

The validity and reliability of the instruments used in this study have been confirmed and reported (Norwicki & Strickland, 1972; Shavelson, 1976). Random assignment of the students to the control and experimental group was made. The three pretests were administered to all of the students during the initial stage of the study. The students were treated identically with regard to the first testing

situation. They were all tested on the same day and in the same room (not their regular classroom). The control group participated in 12 weeks (60 sessions), 60 minutes per day of IMTS instruction with the last 10 minutes being IMTS instruction in mathematics. The experimental group participated in 12 weeks (60 sessions), 50 minutes per day of IMTS instruction plus a 10-minute daily period of CAI in mathematics. The only difference between the two groups was that the experimental group received 10 minutes of CAI in mathematics daily and the control group received 10 minutes of IMTS instruction in mathematics daily.

Students in the experimental group were introduced to the computer individually in order to teach them the basic skills necessary to complete the math instructional exercises. During the computer sessions, the researcher was present, but did not comment on the students' activities thus assuring that the computer was the only source of instruction during the 10-minute CAI period. If a question arose concerning operation of the computer, however, the specific question was answered so that the student could continue the math activity.

After all of the students completed the 12 weeks of instruction, they were given posttests under the same conditions as the pretests. They were all tested on the same day in the same room (not the IMTS laboratory or the regular vocational classroom).

The reliabilities of the SCAA were .82 for males and .77 for females, using Hoyt's analysis of variance (Brookover et al., 1965). Also Shavelson (1976) reported test-retest reliability and adequate

evidence of validity. The remaining two instruments have a similarly high reliability and validity.

Delimitations of the Study

Deliminations for this study were as follows:

1. The subjects were students enrolled in the FTVTP at a vocational skills center in a single urban school district.

2. Basic math skills were measured by the Test of Adult Basic Education.

3. Academic self-concept of ability was measured by the Self-Concept of Academic Ability Scale.

4. Locus of control was measured by the Norwicki-Strickland Personal Reaction Survey.

CHAPTER II
REVIEW OF THE LITERATURE AND THEORETICAL FRAMEWORK

An understanding of high school dropouts, computer assisted instruction, computer assisted instruction and mathematics, academic self-concept, and locus of control requires a knowledge of what is in the current literature about each variable. Therefore, presented in this chapter is a comprehensive review of the literature relative to each variable. A search of the literature was conducted through an on-line computer search, the use of the card catalog in the University of North Florida library, and a review of pertinent research journals.

Theoretical Framework

The theoretical framework for the study consists of theories, concepts, and principles which explain the major variables in the study. The framework provides the context of the study, its rationale, and its significance. The ingredients for the theoretical framework come from analysis, synthesis, and evaluation of the literature and the researcher's insights into the problem. The foundation of the framework are the theories and principles which explain high school dropouts, computer assisted instruction, computer assisted instruction and mathematics, academic self-concept, and locus of control.

The locus of control construct originated from Rotter's (1966) social learning theory. According to social learning theory, the

potential for any given behavior to occur is a function of the individual's expectancy that the behavior will be effective in securing the desired end or reinforcement (Bandura, 1977). In a particular situation, a classroom for example, the probability that a person will make an effort to achieve is directly related to the degree to which the person believes or assumes there is a contingency between effort on one's own part and such rewards as the teacher's approval, good grades, and so on (Lefcourt, 1982).

Attribution theory (Bruner, 1957) is associated with the investigation of the perception of causality, the judgment of why a particular incident occurred. The degree to which individuals perceive their own behavior as the controlling factor in receiving rewards or reinforcements is the measure of their internality. Internals believe that the reinforcements they receive are primarily a result of their own behavior, ability, effort, or characteristics. Individuals at the external end of the locus of control continuum attribute the control of their reinforcements to forces outside themselves: luck, chance, fate, or powerful others (Rotter, 1975).

Computer assisted instruction is based on the assumption that personalized tutoring, immediate feedback-correctives, and frequent reinforcements are essential means for increasing achievement and self-concept (Mevarech & Rich, 1985). A dimension that might be affected by CAI is responsibility for success or failure. Attribution theorists (e.g., Weiner, 1976) have suggested that educational environments that encourage students' responsibility increase internal orientation to a greater extent than traditional instruction in which

the teacher is responsible for learning. Horowitz (1979) reported that children exposed to open classroom practices that emphasized self-responsibility tended to be less externally oriented than children in traditional classrooms.

Academic self-concept is a relatively recent refinement (Brookover, Paterson, & Thomas, 1962) which has grown out of the more general theories of self-concept. The earlier idea of self-concept, an undifferentiated global construct, was comprehensive but overlooked the fact that individuals may view themselves multidimensionally. The theory concerning the multidimensionally of self-concept was developed by Shavelson and Bolus (1982) in their conceptualization of seven critical features of self-concept. They suggested that on the basis of different facets of self-concept that self-concept may be distinguished both from academic achievement and academic self-concept. They also concluded from a study involving 99 junior high school students that academic self-concept is less stable than global self-concept and, therefore, may be changed more easily.

Academic achievement is moderately correlated with general self-concept, more substantially correlated with academic self-concept, and most highly correlated with academic self-concept in the same academic content area (Marsh, 1986). In a study on the cognitive and affective outcomes of disadvantaged pupils, Mevarech and Rich (1985) found that students who participated in a computer assisted instruction mathematics program rated themselves significantly higher on academic self-concept in mathematics achievement than students exposed to the same material in a traditional instructional setting.

The above findings raised the question of the extent that CAI would affect the academic self-concept and the locus of control of high school dropouts enrolled in a full-time vocational training program. Would the high school dropouts involved in CAI feel that it provided equal opportunities to all learners and that the success is within the control of each of them? Or do such students develop a dependency on the computer for checking responses and making decisions concerning one's own learning? Unfortunately, while much research had been focused on the impact of CAI on cognitive growth, almost nothing was known on the effects that CAI would have on the academic self-concept and locus of control of FTVTP students.

The High School Dropout

The high school dropout rate has been especially high in Florida. The 1986 dropout rate in Florida was 38.8% (Sadowski, 1987). Few high school students make an instant decision to leave school on their own. For most the decision is long in the making and is rooted in many years of unhappy school experiences, certain ability and background factors of the individual, and certain behavioral and personality traits (Bachman, Green, & Wirtinen, 1972). Perhaps the primary characteristic of the high school dropout is an unsatisfactory relationship with his or her family. Martin (1981) found that the dropout's family was less solid, less influenced by a father figure, and less able to communicate than the graduate's family.

Svec (1987) concluded that dropouts, when compared to attending students, display similar levels of academic achievement and school performance, but differ with respect to patterns of social ability,

family stressors, and attitudes toward injustice in the classroom. McClellan (1987) presented some of the reasons given by school district leaders for students leaving school. Some of the reasons, presented in rank order from the most commonly cited to the least-often mentioned, were as follows: student had attendance problems, student lacked interest in school, student was bored with school, student had academic problems, student had family problems, student disliked a particular course, and student disliked everything. Kandel and Mensch (1988) reported evidence that participation in a variety of activities in adolescence that are deviant because they contravene general societal norms (e.g., delinquency or the use or marijuana and other illicit drugs) or because they contravene age-related norms for adolescents (e.g., sexual intercourse, pregnancy, or cigarette smoking) greatly increase the risk of dropping out of school.

Computer Assisted Instruction

There have been rapid advances in computer technology in the past 20 years. Education has certainly been a beneficiary of these advancements especially with regard to computer assisted instruction (CAI). Can CAI offer students advantages for learning that teachers or textbooks cannot? Although opinions regarding this issue might differ widely, strong consideration must be given to computer assisted instruction's powerful and varied capabilities for instructional adaptation (Reagan, 1984). An apparent adaptability makes it a very likely method of instruction for remediation.

Drill and practice probably have been the most frequent uses of CAI programs because they are relatively simple to implement and

generally have been successful in improving skill levels. Burns and Bozeman (1981) found that CAI drill and practice were significantly more effective in promoting increased student achievement at both elementary and secondary instructional levels among students who were considered to be high achieving and disadvantaged. They found that achievement among average students was not significantly improved by supplementary enhanced drill and practice CAI.

B.F. Skinner, considered the "grandfather of educational computing" (Zientara, 1984, p. 23), believed that teaching should incorporate individual, interactive instruction and should give the student immediate feedback. His key principle was that each student should be able to progress at his or her own rate and should be reinforced for correct answers immediately. Computers can give power and reinforcement which is a significant motivating force.

Norton (1983) believed that inherent in the structure of a computer environment are cognitive processes for organizing and interpreting information which create habits of thought similar to the cognitive processes associated with creativity and problem solving. In the cognitive domain the computer facilitates the traditional modes of instruction such as drill and practice, tutoring, and remediation.

In the affective domain, Weller (1983) described the computer as being private, patient, unangered, and bias-free, thus providing an excellent vehicle for students to examine their own value systems without detriment to their self-concepts. Cox and Berger (1981) found that students who use microcomputers show positive growth in their

attitudes toward school work, self-control, and tasks which involve problem solving skills. They believed that computers foster positive development of students' self-concepts and promote growth through a sequence of nonthreatening challenges. Gallini (1983) suggested that CAI encourages a constant environment to motivate students toward more creativity, an opportunity seldom available in traditional methods. Basically, CAI is a learning structure that is interactive and individualized. Lesgold (1983) credited the computer's strength to being able to diagnose sources of student errors rapidly and assess progress in their acquisition of skills.

Computer Assisted Instruction and Mathematics

This section contains research studies in which only mathematics achievement is linked to CAI. Hotard and Cortez (1983) initiated a research study on the effectiveness of CAI in a Title 1 mathematics program for grades 5-8. Pre- and postevaluations showed educationally meaningful grade equivalent gains for the CAI group. In a very impressive field study, Poore, Qualls, and Brown (1981) linked functionally illiterate students to a basic skills learning system titled PLATO. The objective was to raise the skill ability of the subjects to an eighth grade level of competency in reading and mathematics. Overall, 207 students had positive grade equivalent gain scores, 18 had negative gain scores, and 11 had no gain from pretest to posttest.

There is cumulative evidence that computers seem to provide an effective means of improving performance in mathematics as well as a wide variety of subjects. Reviews in which CAI is summarized

(Rapoport & Savard, 1980) have all shown quite consistent positive effects on both achievement and attitudes. A growing number of these reviews relate to teaching mathematics to disadvantaged students (Lanese, 1983).

Bradtmueller (1983) summarized what is currently known about the positive and negative effects concerning CAI. Covering the period from 1975 to 1983, Bradtmueller indicated the following pros and cons of using microcomputers. Advantages of using microcomputers include the following:

1. highly motivating and encouraging,
2. helps prepare students for a computer world,
3. fosters independent study,
4. gives immediate feedback to students,
5. encourages individualization, and
6. nonthreatening.

Disadvantages of the use of microcomputers include the following:

1. too expensive to purchase and maintain,
2. require excessive time for teachers to learn to operate,
3. there is incompatibility of software programs,
4. the forced multiple choice format requires no writing,
5. the software is poor and expensive, and
6. cost is often the major factor in the purchase rather than the program.

Shively (1984) found that deficiencies in basic mathematics skills also can be remediated at the secondary level using microcomputers. Another matter of considerable importance revealed in

Shively's study was that previous microcomputer experiences have little impact on student outcomes. In fact, the trend seemed to be that those who had no computer experience did better than those who had them. Wulforst (1985) studied three classes of secondary students. Her analysis of data revealed that CAI produced significantly higher mathematics achievement scores in remediating students than conventional classroom instruction.

The literature relating computer assisted instruction to mathematics performance leads to the conclusion that a positive relationship exists. Also it seems that CAI is beneficial to some ethnic groups over others and that the degree of impact computers have on education in many areas of instruction is only beginning to be studied systematically. What emerged from a search of the literature, and which was the primary focus of this study, was a greater understanding of the effects of the instructional use of computers especially in the field of CAI.

Academic Self-Concept

Academic self-concept is moderately correlated with general or global self-concept, more substantially correlated with academic self-concept, and most highly correlated with academic self-concept in the same academic content area (Marsh, 1986). This pattern of relationships supports the construct validity of a multidimensional self-concept. Marsh noted that much of the interest in this relationship stems from the belief that academic self-concept has motivational properties such that changes in it will lead to changes

in subsequent academic achievement. Self-concept is not a constant factor in one's personality.

Self-concepts are not unalterably fixed, but rather modified by every life experience through at least the maturing years (LaBenne & Greene, 1969). A person may think better or worse of himself or herself and that person should, therefore, be provided with experiences in which positive feelings are nurtured.

The undifferentiated idea of a global self-concept as having relevance to educational practices was first introduced by Brookover, Paterson, and Thomas (1962) with the introduction of their theory that there is an aspect of a person's self-concept which is directly related to the person's perception of himself or herself as a learner. The theory concerning the multidimensionality of self-concept was developed by Shavelson and Bolus (1982) in their recent conceptualization of seven critical features of self-concept. From their research they concluded that self-concept is a multidimensional construct and that global self-concept is distinct from but correlated with academic self-concept. It is important, also, to note their conclusion that academic self-concept is less stable than global self-concept and, therefore, may be changed more easily (Shavelson & Bolus, 1982). In addition, Wylie (1979) concluded that stronger relationships exist between academic self-concept, as compared to correlations involving global self-concept, and ability measures.

Felker et al. (1973) developed and implemented a teacher program, the primary focus of which was to enhance student self-concept. Two half-day training sessions were held to help teachers understand the

fundamentals of increasing self-rewarding behavior of children. From the results of the 12-week it can be suggested that teachers who increase self-rewarding behaviors of their students will also significantly increase the self-concepts of those students. Not only did these researchers confirm the claim that self-concept can be changed by increasing the self-rewarding behavior of students, but they also supported the claim that self-concept can be changed in the short-term, in this case 12 weeks.

Academic self-concept has also been studied as a dependent variable. Brookover et al. (1965) attempted to determine interventions which might enhance academic self-concept. They trained parents to provide positive communications with their children concerning school work and encouraged them to create an atmosphere which provided reinforcement for their children's positive statements about school. Students whose parents had the training showed a significant, positive increase in academic self-concept as compared to students who did not have the training.

Kifer (1975) found that differences in academic self-concept are brought about by interactive outcomes with the educational environment. These findings tend to support the idea that different teaching styles, modes of instruction, motivational factors, and types of feedback can have an effect on students' academic self-concept which, of course, in turn, may affect achievement levels.

Given the generally accepted proposition that a higher self-concept is desirable, it would appear that educational leaders have the responsibility to determine why academic self-concept changes, in

what situations change is likely to occur, and in what direction it will change. Thus, examining changes in academic self-concept with regard to educational environments can result in educational leaders creating learning situations which will enhance the development of higher academic self-concept in students.

Locus of Control

It is not only the responsibility of educators to develop a more positive academic self-concept in their students, but also to develop individuals who believe that they control their own destinies, at least to some degree (Phares, 1976). Rotter conceptualized this belief and developed a theory of internal-external locus of control reinforcement. He defined locus of control as a person's perception of the degree to which the reward follows from, or is contingent upon, his or her own behavior or attributes versus the degree to which he or she feels the reward is controlled by forces outside of himself or herself and may occur independently of his or her own actions (Rotter, 1966).

Also of importance to the individual and to the school is the finding that not only do internals more actively seek to control their environments, they also more actively seek to control themselves (Phares, 1976). Just as a person's academic self-concept can change, so too can his or her locus of control. Stephens (1976) examined the effects of two classroom techniques and their impact on locus of control. He found significant differences in locus of control scores and concluded that classroom experiences can have systematic effects on locus of control scores. It may be, therefore, that a particular

student who works on a computer may perceive himself or herself differently in the computer situation as a result of that computer interaction.

Ayabe and Nitahara-Pang (1981) were able to actually modify locus of control scores of college students through two half-hour sessions in mnemonic training. Those students given the treatment had significantly more internal scores than those who did not. This strongly suggests the potential for affecting locus of control via manipulation of teaching/learning strategies over a short period of time. The use of short time spans in studying the changeability of academic self-concept and locus of control is desirable because of the possible contamination which might result in normal maturational changes which occur over time (Penk, 1969).

It appeared to the researcher from the conclusions drawn from Rotter's findings that the development of more internally directed individuals will create adults who are more competent and able to deal with the expectations they have for themselves. It also seemed that not only is locus of control related to particular personal and cognitive factors, but it is also subject to modification by manipulating the environment. Internal control is, therefore, another affective trait to be nurtured and developed by providing an appropriately supportive educational environment for high school dropouts.

Summary

The literature reviewed in this chapter contained relevant research on those topics pertinent to the present investigation, i.e.,

the high school dropout, computer assisted instruction, computer assisted instruction and mathematics, academic self-concept, and locus of control. Researchers have indicated that these variables have impact not only in educational contexts but also in economic and sociological settings. Furthermore, the research discussed was basic to the rationale which served as the basis for this investigation.

Researchers of high school dropouts seem to indicate that dropouts have difficulty adjusting to the traditional curriculum in regular school. McClellan (1987) reported that dropouts had attendance problems, lacked interest in school, and had academic problems.

From the literature relating computer assisted instruction to mathematics performance, it can be suggested that a positive relationship exists. Shively (1984) found that deficiencies in basic skills mathematics can also be remediated at the secondary level using microcomputers.

The major implication of the research on self-concept is that self-concept is not unalterably fixed, but rather modified by every life experience. Academic self-concept is less stable than global self-concept and, therefore, may be changed more easily (Shavelson & Bolus, 1982). Phares (1976) concluded that just as a person's academic self-concept can change, so too can his or her locus of control. Educators have the responsibility to determine why academic self-concept and locus of control change, in what situations change is likely to occur, and in what direction it will change. Educational leaders, in particular, have the responsibility of developing and

implementing policies and programs that are consistent with the research findings on self-concept and locus of control.

CHAPTER III
RESEARCH FINDINGS

The purpose of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a dropout retrieval program in an urban setting.

To this end, answers to six questions were sought. This chapter contains the results of the statistical analyses of data obtained in regard to the six questions. A subprogram of the Statistical Analysis System, version 5.08 (SAS, 1986), was used to calculate the *t* test and analysis of covariance (ANCOVA). The data were analyzed using a *t* test to determine if significant changes occurred in basic skills math achievement, academic self-concept of ability, and locus of control from the pretest to the posttest with regard to the type of treatment given. A two-way analysis of covariance was used in order to determine differences in adjusted mean scores on all measures with regard to sex, type of instruction, and the interaction between sex and type of instruction. The analysis of covariance is used to adjust for possible differences on the input variables (pretests). Further, it is a powerful statistical test with which to determine significant differences among groups (Huck et al., 1974). This chapter is organized according to the six questions that were used to guide the study.

Question 1

> Is there a significant difference ($p < .05$) between the pre- and postexperiment mathematics scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

Means and standard deviations for the basic skills mathematics pretest and posttest scores were computed for the computer assisted instruction (CAI) group and the non-CAI group. For the CAI group the mean pretest score was 8.49 with a standard deviation of 1.50. The minimum value of a pretest score was 4.60 and the maximum value was 11.40. The range for the pretest scores was 6.80. The mean posttest score of the CAI group was 8.45 with a standard deviation of 1.74. The minimum value of a posttest score was 4.10 and the maximum value was 11.50. The range for the posttest scores was 7.40.

For the non-CAI group the mean pretest score was 8.36 with a standard deviation of 1.42. The minimum value of a pretest score was 5.10 and the maximum value was 10.60. The range for the pretest scores was 5.50. The mean posttest score of the non-CAI group was 8.50 with a standard deviation of 1.60. The minimum value of a posttest score was 5.00 and the maximum value was 11.00. The range for the posttest scores was 6.00 (see Table 1).

A t test was used to determine if significant changes occurred in basic skills mathematics scores from the pretest to the posttest for the CAI group and for the non-CAI group. There were no statistically significant ($p < .05$) changes in basic skills mathematics scores for

Table 1
Results of t Test Comparisons for Pre- and Posttest Basic Skills Mathematics (BSM) Scores for a Computer Assisted Instruction (CAI) Group and for a Non-CAI Group

Group	Mean Pretest Score	SD[a]	Mean Posttest Score	SD	t	r[b]	p
CAI (n = 37)	8.49	1.50	8.45	1.74	-0.16	0.68	0.87
Non-CAI (n = 39)	8.36	1.42	8.50	1.60	0.81	0.76	0.42

[a]SD is the standard deviation. [b]r denotes correlation.

the CAI group (t = 0.16, r = 0.68, p = 0.87) or for the non-CAI group (t = 0.81, r = 0.76, p = 0.42). These results were unanticipated and inconsistent with prior research. Factors contributing to the unanticipated results could have been the short duration of the instructional period (12 weeks), the short daily exposure to the CAI in mathematics (10 minutes daily) for the CAI group, and the short daily exposure to IMTS instruction in mathematics (10 minutes daily) for the non-CAI group.

Question 2

> Are the adjusted posttest scores of the FTVTP students in basic skills mathematics significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

A two-way analysis of covariance was used to determine differences in adjusted posttest scores using the pretest scores as the covariate. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction. There were no statistically significant differences in adjusted posttest basic skills mathematics scores with regard to type of instruction (F = .02, p = 0.90), sex (F = 2.32, p = 0.13), or the interaction between sex and type of instruction (F = .22, p = 0.60) (see Table 2).

These findings indicate that basic skills mathematics scores were not significantly affected by either type of instruction or sex of the student. In addition, there were no significant sex differences with

Table 2
Analysis of Covariance for Posttest Measures of Basic Skills
Mathematics: General Linear Models Procedure

Dependent Variable: Math 2[a]

Source	DF	Sum of Squares	Mean Square	*F* Value	PR>*F*	R^2	C.V.
Model	4	111.80	13.9	9.88	0.0001	0.54	14.03
Error	72	94.79	1.41	Root MSE		Math 2 Mean	
Corrected Total	76	206.60		1.19		8.48	

Source	DF	Type I SS	*F* Value	PR>*F*	DF	Type III SS	*F* Value	PR>*F*
Math 1[a]	1	105.81	74.79	0.0001	1	98.59	69.69	0.0001
Group	1	0.44	0.31	0.58	1	0.022	0.02	0.90
Sex	1	3.28	2.32	0.13	1	3.26	2.30	0.13
Group x Sex	1	0.246	0.17	0.68	1	0.31	0.22	0.60

[a]Math 2 is posttest mean and Math 1 is pretest mean.

regard to students given the CAI program versus the program without CAI. Though not statistically significant, it is interesting to note that the mean difference between the adjusted posttest and pretest scores of the females in the CAI program (-0.33) and the females in the non-CAI program (-0.32) decreased slightly and almost to the same degree. The males in the CAI program (0.13) and the program without CAI (0.37) increased their scores slightly (see Table 3).

Question 3

> Is there a significant difference ($p < .05$) between the pre- and postexperiment academic self-concept scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

Means and standard deviations were computed for the academic self-concept pretest scores and posttest scores for the CAI and the non-CAI group. For the CAI group the mean pretest score was 25.65 with a standard deviation of 7.34. The minimum value of a pretest score was 15.00 and the maximum value was 41.00. The range for the pretest scores was 26.00. The mean posttest score of the CAI group was 29.65 with a standard deviation of 7.88. The minimum value of a posttest score was 15.00 and the maximum value was 44.00. The range for the posttest scores was 29.00.

For the non-CAI group the mean pretest score was 28.51 with a standard deviation of 7.75. The minimum value of a pretest score was 16.00 and the maximum value was 45.00. The range for the pretest scores was 29.00. The mean posttest score of the non-CAI group was

Table 3
Mean Pretest Basic Skills Mathematics (BSM), Adjusted Means Posttest BSM Scores, and Mean Difference Between Adjusted Posttest BSM and Pretest BSM Scores

Group	N	Mean Pretest BSM	Adjusted Mean Posttest BSM	Mean Difference
Female CAI	13	9.12	8.78	-0.33
Female Non-CAI	13	9.06	8.63	-0.32
Male CAI	24	8.15	8.27	0.13
Male Non-CAI	26	8.07	8.44	0.37

29.21 with a standard deviation of 12.38. The minimum value of a posttest score was 17.00 and the maximum value was 57.00. The range for the posttest scores was 40.00 (see Table 4).

A *t* test was used to determine if significant changes occurred in academic self-concept scores from the pretest to the posttest for each of the two groups (CAI and non-CAI) of FTVTP students. There were no statistically significant changes in academic self-concept within the group without CAI ($t = 0.31$, $r = 0.11$, $p = 0.76$). However, the data indicate a statistically significant change in academic self-concept scores for students given the CAI ($t = 2.51$, $r = 0.19$, $p = 0.02$). This is consistent with previous research findings which indicate that CAI fosters students' academic self-concept through a series of nonthreatening challenges.

Question 4

> Are the adjusted posttest scores of the FTVTP students in academic self-concept significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

A two-way analysis of covariance was used to determine differences in adjusted academic self-concept scores using the pretest academic self-concept scores as the covariate. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction. There was a statistically significant difference in adjusted posttest academic self-concept scores with regard to sex ($F = 4.17$, $p = 0.05$) (see

Table 4
Results of t Test Comparisons for Pre- and Posttest Academic Self-Concept (ASC) Scores for a Computer Assisted Instruction (CAI) Group and for a Non-CAI Group

Group	Mean Pretest Score	SD[a]	Mean Posttest Score	SD	t	r[b]	p
CAI (n = 37)	25.65	7.34	29.65	7.88	2.51	0.19	0.02
Non-CAI (n = 39)	28.51	7.75	29.21	12.38	0.31	0.11	0.76

[a]SD denotes standard deviation. [b]r denotes correlation.

Tables 5 and 6). However, there was no significant difference with regard to type of instruction (*F* = .02, *p* = 0.88) or the interaction between sex and type of instruction (*F* = .00, *p* = 0.97). The results indicate that FTVTP males probably increased their academic self-concept scores as a result of CAI, whereas FTVTP females neither increased nor decreased their scores significantly.

Question 5

> Is there a significant difference ($p < .05$) between the pre- and postexperiment locus of control scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

Means and standard deviations for the locus of control pretest and posttest scores were computed for the CAI and the non-CAI group. For the CAI group the mean pretest score was 15.76 with a standard deviation of 5.23. The minimum value of a pretest score was 7.00 and the maximum value was 15.00. The range for the pretest scores was 8.00. The mean posttest score of the CAI group was 16.35 with a standard deviation of 5.86. The minimum value of a posttest score was 7.00 and the maximum value was 26.00. The range for the posttest scores was 19.00.

For the non-CAI group the mean pretest score was 14.31 with a standard deviation of 4.62. The minimum value of a pretest score was 7.00 and the maximum value was 25.00. The range for the pretest scores was 18.00. The mean posttest score of the non-CAI group was

Table 5
Analysis of Covariance for Posttest Measures of Academic Self-Concept: General Linear Models Procedure

Dependent Variable: ASC 2[a]

Source	DF	Sum of Squares	Mean Square	*F* Value	PR>*F*	R^2	C.V.
Model	4	1440.63	180.08	1.82	0.09	0.18	33.79
Error	72	6621.90	98.83				
				Root MSE		Math 2 Mean	
Corrected Total	76	8062.53		9.94		29.42	

Source	DF	Type I SS	*F* Value	PR>*F*	DF	Type III SS	*F* Value	PR>*F*
ASC 1[a]	1	143.29	1.45	0.23	1	3.21	0.03	0.86
Group	1	18.20	0.18	0.67	1	2.32	0.02	0.88
Sex	1	412.31	4.17	0.05	1	354.056	3.58	0.06
Group x Sex	1	0.00	0.00	0.99	1	0.10	0.00	0.97

[a]ASC 2 is posttest mean and ASC 1 is pretest mean.

Table 6
Mean Pretest Academic Self-Concept (ASC), Adjusted Means Posttest ASC Scores, and Mean Difference Between Adjusted Posttest ASC and Pretest ASC Scores

Group	*n*	Mean Pretest ASC	Adjusted Mean Posttest ASC	Mean Difference
Female CAI	13	25.92	26.69	0.77
Female Non-CAI	13	26.92	25.46	-1.46
Male CAI	24	25.50	31.25	5.65
Male Non-CAI	26	29.31	31.08	1.77

15.23 with a standard deviation of 5.34. The minimum value of a posttest score was 7.00 and the maximum value was 25.00. The range for the posttest scores was 18.00 (see Table 7).

A *t* test was used to determine if significant changes occurred in locus of control scores from the pretest to the posttest for each of the two groups (CAI and non-CAI) of students. There were no statistically significant differences in locus of control scores from pretest to posttest for the CAI group ($t = 0.45$, $r = 0.02$, $p = 0.65$) or the group without CAI ($t = 0.78$, $r = 0.09$, $p = 0.44$). These findings were not anticipated in that there is support in the literature for the proposition that CAI will increase the internal locus of control orientation of students.

Question 6

> Are the adjusted posttest scores of the FTVTP students in locus of control significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

A two-way analysis of covariance was used to determine differences in adjusted posttest locus of control scores using the pretest scores as the covariate. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction (see Table 8). There were no statistically significant differences in adjusted posttest, locus of control scores with regard to type of instruction ($F = 0.97$, $p = 0.33$) or the interaction between sex and type of instruction

Table 7
Results of t Test Comparison for Pre- and Posttest Locus of Control (LOC) Scores for a Computer Assisted Instruction (CAI) Group and for a Non-CAI Group

Group	Mean Pretest Score	SD[a]	Mean Posttest Score	SD	t	r[b]	p
CAI (n = 37)	15.76	5.23	16.35	5.86	0.45	-0.02	0.65
Non-CAI (n = 39)	14.31	4.62	15.23	5.34	0.78	-0.09	0.44

[a]SD is the standard deviation. [b]r denotes correlation.

Table 8
Analysis of Covariance for Posttest Measures of Locus of Control: General Linear Models Procedure

Dependent Variable: LOC 2[a]

Source	DF	Sum of Squares	Mean Square	F Value	PR>F	R^2	C.V.
Model	4	572.20	71.53	2.70	0.0122	0.24	32.60
Error	72	1772.99	26.46				
				Root MSE		Math 2 Mean	
Corrected Total	76	2345.20		5.1441		15.78	

Source	DF	Type I SS	F Value	PR>F	DF	Type III SS	F Value	PR>F
LOC 1[a]	1	4.19	0.16	0.69	1	11.58	0.44	0.51
Group	1	27.48	1.04	0.31	1	25.59	0.97	0.33
Sex	1	401.44	15.17	0.0002	1	392.9	14.85	0.0003
Group x Sex	1	36.65	1.39	0.24	1	37.16	1.40	0.24

[a]LOC 2 is posttest mean and LOC 1 is pretest mean.

(F = 1.40, p = 0.24). However, a significant result was noted for sex (F = 15.17, p = 0.0002). These findings suggest that an IMTS program with or without CAI may result in male students having a more internal locus of control orientation. The IMTS programs may contribute to FTVTP male students perceiving that the reinforcements they receive as a result of their behaviors are caused by their own abilities, efforts, or hard work.

Locus of control was not significantly affected by the CAI program or the program without CAI for females. Though not statistically significant, it is interesting to note the mean difference between the adjusted posttest and pretest scores for males and females in the two groups. The difference between the adjusted posttest mean and covariate for females in the CAI program was 5.85 and for females in the program without CAI it was 4.92. The males in the CAI program (-2.25) and the program without CAI (-0.18) became more internal. Although not significant, the trend in Table 9 indicates that CAI tended to shift the locus of control orientation of males from external to internal.

Summary

This chapter contains the findings of the study. Results have been presented for the statistical tests conducted on six questions.

Answer to Question 1: No significant differences occurred in basic skills mathematics scores from the pretest to posttest in the CAI group or the group without CAI.

Table 9
Mean Pretest Locus of Control (LOC), Adjusted Means Posttest LOC Scores, and Mean Difference Between Adjusted Posttest LOC and Pretest LOC Scores

Group	n	Mean Pretest LOC	Adjusted Mean Posttest LOC	Mean Difference
Female CAI	13	14.54	20.38	5.85
Female Non-CAI	13	12.69	17.62	4.92
Male CAI	24	16.42	14.17	-2.25
Male Non-CAI	26	15.12	14.04	-0.18

Answer to Question 2: No significant differences occurred in adjusted posttest basic skills mathematics scores with regard to type of instruction, sex, or the interaction between sex and type of instruction.

Answer to Question 3: A significant change in academic self-concept scores occurred for students in the CAI program. No statistically significant change in academic self-concept occurred within the group without CAI.

Answer to Question 4: A significant difference occurred in the adjusted posttest scores in academic self-concept between males and females for the sample of FTVTP students. The males' academic self-concepts significantly increased. There were no significant differences with regard to type of instruction or the interaction of sex and type of instruction.

Answer to Question 5: No significant differences occurred in the locus of control scores from the pretest to the posttest in the CAI group or the group without CAI.

Answer to Question 6: No significant differences occurred in adjusted posttest scores for locus of control with regard to type of instruction or the interaction between sex and type of instruction. A significant difference was noted for sex. Males' locus of control became significantly more internal.

CHAPTER IV
SUMMARY, DISCUSSION AND CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

A summary of the study, discussion of results, conclusions, recommendations for future research, and implications are included in this chapter.

Summary

The purpose of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a selected dropout retrieval program in an urban setting. A pretest-posttest experimental group design was used to examine six questions using a sample of 84 students. The study was conducted over a period of 12 weeks. The six questions were as follows:

1. Is there a significant difference ($\underline{p} < .05$) between the pre- and postexperiment mathematics scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

2. Are the adjusted posttest scores of the FTVTP students in basic skills mathematics significantly affected ($\underline{p} < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

3. Is there a significant difference ($p < .05$) between the pre- and postexperiment academic self-concept scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

4. Are the adjusted posttest scores of the FTVTP students in academic self-concept significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

5. Is there a significant difference ($p < .05$) between the pre- and postexperiment locus of control scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

6. Are the adjusted posttest scores of the FTVTP students in locus of control significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

Pretests administered during the first week of the study were used to measure students' basic skills mathematics achievement, academic self-concept, and locus of control. Posttests identical to the pretest were administered the week following the 12-week treatment period. The first dependent variable, basic skills mathematics, was measured using the Tests of Adult Basic Education (TABE), Level D mathematic skills (TABE, Technical Report, 1978). The second dependent variable, academic self-concept, was measured using the

Self-Concept of Academic Ability Scale (SCAA) (Brookover et al., 1965). The third dependent variable, locus of control, was measured using the Norwicki-Strickland Personal Reaction Survey (Norwicki & Strickland, 1972).

Data were collected and analyzed using the *t* test and a two-way analysis of covariance. A *t* test was used to determine if significant changes occurred in basic skills mathematics, academic self-concept, and locus of control from the pretest to the posttest for the CAI group and the non-CAI group. A two-way analysis of covariance was used to determine differences in adjusted posttest scores using the pretest scores as covariates. The posttest scores were analyzed for differences with regard to sex, type of instruction, and the interaction between sex and type of instruction.

No statistically significant ($p < .05$) results were found for Questions 1, 2, and 5. No significant change was found in basic skills mathematics scores from pretest to posttest in the CAI group or the group without CAI (Question 1). No significant difference was found in adjusted posttest basic skills mathematics scores with regard to sex, the type of instruction, or the interaction between sex and the type of instruction (Question 2). No significant difference in academic self-concept scores was found between the two treatment groups alone or the interaction between sex and type of instruction. However, a significant difference was found for sex (Question 4). No significant difference was found in locus of control scores from pretest to posttest in the CAI group or the group without CAI (Question 5).

A significant difference did occur in the academic self-concept scores from prettest to posttest for the CAI group (Question 3). The group that was given CAI had higher academic self-concept scores after the experiment. These findings support the claim that CAI can improve the academic self-concept of some students. A significant difference in the adjusted posttest mean scores on locus of control was found between males and females (Question 6). The findings indicate that males who received CAI and the non-CAI had higher adjusted posttest locus of control scores than did females of the same treatment group. The sex difference appeared without regard to the type of instruction given.

Discussion and Conclusions

The purpose of this study was to determine the effects of a computer assisted remediation program on basic skills mathematics achievement, academic self-concept, and locus of control of students in a selected dropout retrieval program. Six questions were examined.

After controlling for pretest variability, results of analyses of covariance indicated students exposed to the CAI program did not score significantly different on basic skills mathematics achievement, academic self-concept, and locus of control than did the group without CAI. There was no significant difference in basic skills mathematics achievement or academic self-concept between males and females. However, a significant difference was found between males and females for locus of control.

Question 1: Is there a significant difference ($p < .05$) between the pre- and postexperiment mathematics scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

The *t* test performed on the students' basic skills mathematics showed no significant difference between the pretest and posttest scores for the group of students assigned to the CAI program or the students without the CAI. The insignificant difference between pretest and posttest scores of the group without CAI was expected. However, the insignificant difference between pretest and posttest scores for the CAI group was unexpected and inconsistent with previous findings that showed the superiority of CAI in increasing posttest scores in mathematics. One methodological factor that might have contributed to this finding is the novelty of the technology. The innovative nature of CAI as compared with the traditional individualized instruction might have confounded the results. It is quite possible that the assisting IMTS teacher as well as the assisting IMTS aide and the students who used the CAI programs had difficulty adjusting to the new technology. These difficulties might have led to low efficiency in the use of the computer.

Question 2: Are the adjusted posttest scores of the FTVTP students in basic skills mathematics significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

After controlling for pretest variability, results of the analysis of covariance indicated that students exposed to the CAI

treatment did not score significantly higher in basic skills mathematics than students not exposed to the CAI treatment. The study also showed no significant differences in basic skills mathematics between males and females or the interaction between mode of instruction and sex.

The insignificant differences between the two treatments on the dependent variable basic skills mathematics were unexpected and contradict the many findings from previous research of superiority of CAI in mathematics over a traditionally individualized study program. Ten minutes of exposure to the CAI program was probably not enough and future researchers may want to increase the CAI exposure. Also, there were no significant differences in basic skills mathematics scores with regard to sex or the interaction between sex and type of instruction. These results were expected and provide further empirical evidence that the main differences in mathematics achievement between boys and girls are due to environmental factors rather than to biological causes.

> Question 3: Is there a significant difference (p < .05) between the pre- and postexperiment academic self-concept scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

The t test performed on the students' academic self-concept scores showed no significant difference from the pretest to the posttest for the students in the group without CAI. However, there was a statistically significant (t = 2.51, p = .02) change from

pretest to posttest scores in academic self-concept for students in the CAI program. This was consistent with literature in that students in a CAI mathematics program will rate themselves significantly higher on self-concept in mathematics than those in an individualized program without CAI. There are several possible reasons why the CAI may have a positive effect on academic self-concept. First, mastery of subject matter content and development of computer literacy may be potential sources of positive affective development. Secondly, the nonjudgmental/neutral and consistent reinforcement offered by the computer is an optimal reward situation. Finally, the freedom from embarrassment, disapproval, and diminished status often accompanying a mistake in the classroom is reduced by the privacy of the CAI learning situation. This reduction in negative reinforcement allows the student to learn through trial and error at his or her own pace. Therefore, positive academic self-concept can be protected and enhanced.

> Question 4: Are the adjusted posttest scores of the FTVTP students in academic self-concept significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

After controlling for pretest variability, results of the analysis of covariance indicated that students exposed to the CAI treatment did not score significantly different in academic self-concept than students not exposed to the CAI treatment. Ten minutes of exposure to the CAI program probably was not enough to increase academic self-concept. Further studies should be conducted with a

greater exposure time to CAI. There was a significant difference in adjusted posttest scores with regard to sex (F = 4.17, p = .05). However, there was no significant difference with regard to the interaction between sex and type of instruction.

The results provide evidence for the proposition that FTVTP males increase their academic self-concept scores as a result of participating in an IMTS program with or without CAI in mathematics, whereas FTVTP females neither increase nor decrease their scores significantly. It may be concluded from this research that males' confidence in their academic abilities and feelings about their school performance increased significantly as a result of enrolling in a remedial program with or without computers; however, the remedial program with or without a CAI math program did not significantly change the confidence of the females in their academic abilities. Further research should be conducted to determine why the CAI program or the non-CAI program does not significantly change the academic self-concept scores of girls.

While a basic thrust of this study was to determine the effects of a computer assisted remedial program on the basic skills mathematics, academic self-concept, and locus of control scores of students in a remedial program with or without CAI and with regard to mode of instruction, sex, and the interaction between sex and mode of instruction, the conclusion regarding sex differences may prove to be useful in terms of planning for IMTS programs for FTVTP students. It is possible that IMTS programs with or without computers provide a more effective means of affective instruction for males; i.e., males

feel more confident in their academic abilities when it is acquired through an individualized study program such as IMTS which provides for more independence and less input from the teacher. It may also be a societal phenomenon that encourages individuals to perceive that working independently in individualized study programs is more within the male domain than the female. Whatever the reason for the difference in academic self-concept between the males and females, it has been shown that the IMTS program had a more positive effect on the affective development of academic self-concept for males than females and this finding should be examined further and taken into account when developing remediation programs in basic skills mathematics for students in a dropout retrieval program.

> Question 5: Is there a significant difference ($\underline{p} < .05$) between the pre- and postexperiment locus of control scores for (a) FTVTP students who received computer assisted instruction as a part of their IMTS instruction (CAI group) and (b) FTVTP students who received the conventional IMTS instruction (non-CAI group)?

The $\underline{t}$ test performed on the students' locus of control scores showed no significant difference between the pretest and the posttest scores for students with or without the CAI. The insignificant difference between pretest and posttest scores for the CAI group was unexpected and inconsistent with previous findings in which superiority of CAI over individualized instruction in increasing locus of control scores for students was demonstrated.

Question 6: Are the adjusted posttest scores of the FTVTP students in locus of control significantly affected ($p < .05$) by (a) type of instruction (CAI vs. non-CAI), (b) sex (male vs. female), or (c) interaction of mode of instruction and sex?

After controlling for pretest variability, results of the analysis of covariance indicated that students exposed to the CAI treatment did not score significantly different in locus of control than the students who were not exposed to the CAI treatment. Ten minutes of exposure to CAI probably was not enough to significantly increase the locus of control scores. Further research should be conducted using greater exposure times to CAI. There was a significant difference in adjusted posttest scores with regard to sex ($F = 15.17$, $p = .0002$). However, there was no significant difference with regard to type of instruction or the interaction between sex and type of instruction.

The results provide evidence that FTVTP males increase their locus of control scores as a result of participating in an IMTS program with our without CAI, whereas females neither increased nor decreased their scores significantly. It may be that males for societal or other reasons may be more inclined to feel comfortable working independently in an individualized instructional setting such as IMTS and females may prefer a setting that provides more interaction between teachers and students in the classroom.

Development of academic self-concept as well as locus of control is partly a function of social interaction; that is, it changes in response to how individuals are treated. From the existing literature

it can be suggested that CAI is motivating and encouraging and provides a nonthreatening environment. Also, from the literature it can be suggested that CAI provides a mode of contingent reinforcement which provides intrinsic rewards which, in turn, foster reliance on inner motivation and evaluation as opposed to dependence on praise from others. This is not consistent with the findings in this study. From this study there is the indication that an IMTS program with or without CAI will significantly shift the locus of control orientation for males from external to internal, thereby making males feel they have a sense of more control over their successes and failures in the classroom. Further research should be conducted to determine why the IMTS program did not significantly change the locus of control scores of females.

Recommendations for Future Research

At issue in this study was the effectiveness of providing CAI in order to help students improve basic skills mathematics achievement, develop a more positive academic self-concept, and develop a more internal locus of control. Since only a small sample of FTVTP students was studied, it was impossible to determine when the students may have been most affected by the type of CAI they are given. Thus, perhaps future researchers will determine if CAI has less impact at certain stages of development and more at others. The short-term effects on students of short-term exposure to CAI were examined; therefore, an assessment cannot be made of the effect of long-term exposure to CAI or the long-term effects that any degree of exposure to CAI may have on students' basic skills mathematics achievement,

academic self-concept, and locus of control. Therefore, recommendations for further study include examining a larger student sample at various age levels and determining the effects of long-term exposure to computers and CAI. In this study a program was administered to the students consisting of CAI for only 10 minutes per day. The impact on students might be different if CAI was provided for a longer period each day. Studies should be conducted varying the daily exposure of CAI to a quantity greater than 10 minutes until an exposure level is obtained that would significantly increase basic skills math, academic self-concept, and locus of control scores.

Researchers might also want to control for socioeconomic status when looking at academic self-concept and locus of control; it may be that a student with parents in a high socioeconomic status might be less affected by the type of CAI he or she receives than a child with parents from a low socioeconomic status. In addition, researchers could study students with initial high and low academic self-concept and those with initial internal and external locus of control as these groups might be affected differently by CAI. For example, it might be that males and/or females with high academic self-concept and internal locus of control may be more resistent to influence by any type of CAI, whereas students with low academic self-concept and external locus of control may be more susceptible to change due to various CAI programs.

The interesting difference which appeared on the measures of academic self-concept and locus of control between the males and females may also indicate the need for further research into the area

of sex differences. It will be important to examine the differential effects that an IMTS program may have on the academic self-concept and locus of control of males and females and further to examine why these differences occur. This will be important in the future to assure that sex biases with regard to IMTS instruction with or without computer usage are minimized.

Since it was found that an IMTS program can affect FTVTP male students' affective development, it might also be interesting to examine the relative impact of teacher feedback as compared to an IMTS program with or without computers in order to determine whether male students' academic self-concept and locus of control are affected more or less by human versus IMTS instruction interaction.

As computers and remedial programs such as the IMTS program are increasingly used to educate academically disadvantaged students, the issues surrounding the most beneficial/effective type of software and structure of remedial programs will increase. From this study it can be suggested that there is a need for educators, those who write educational computer software, and those who design remedial programs to more closely examine and seriously take into account the effect that remedial programs with or without CAI may have on FTVTP students' cognitive and affective development.

Implications

Typically, males compose nearly 70% of the population of IMTS laboratories. The population of vocational programs requiring the best mathematical skills such as drafting, carpentry, electronics, and computer repair is approximately 90% males. Males also are more

likely to drop out of vocational programs and present more discipline problems. With the increasing enrollment of students in the FTVTP, this study has importance for educators. The IMTS programs with or without computers appear to be better for males than females in giving males a sense of more control over their educational environment and more confidence in their academic abilities. Therefore, with limited space in IMTS programs, educators may want to ensure that males have priority entry over females into IMTS. An alternate learning program may need to be found for females.

The results of this study add to the growing body of information on the effects of different types of instruction on the affective and cognitive development of students in a dropout retrieval program. Findings of the present study do not provide support for previous studies in which researchers have shown that basic skills mathematics scores, academic self-concept, and locus of control of students can be changed in the short-term through CAI. Additionally, gender appears to have generally marked significance when considering these relationships. It was found that an IMTS program with or without CAI improves the academic self-concept and locus of control scores of male but not female students.

Use of the selected instruments and the appropriate statistical treatments relevant to this study were workable and productive. Therefore, the significance of extending the utilized method to include a larger sample and to include other identifiable characteristics of FTVTP students (socioeconomic status, ethnicity, age, etc.) is indicated.

A final implication is pertinent to the importance of thoroughly assessing FTVTP students prior to their final enrollment into selected areas of training. Not only academic achievement levels should be determined, but also perceptions of academic self-concept and locus of control. Information obtained from these assessments would provide vocational administrators, counselors, and faculty members with a broader understanding of student placement needs and subsequent advancement in selected fields of training.

APPENDIX A
PERMISSION LETTER TO PARENTS

January 4, 1988

Dear Parents,

During January, February, March and April of this year, I will be conducting a research study with the Full-Time Vocational Training Program (FTVTP) students which will help to determine the effectiveness of a computer remediated program on the student's basic skills mathematics achievement, academic self-concept, and locus of control. This study is part of a program evaluation effort of Duval County Research and Evaluation Department on the Individualized Manpower Training System Program. It is important to ascertain if a computer remediated program will promote the development of a positive self-concept and a feeling of control over the FTVTP student environment.

Many of you know me as I have been in contact with you previously concerning your children on various school items. This study has been approved by the Board of Education as having educational value to the school district and should help me complete my doctorate. The students should benefit greatly from the computer remediate program.

The program will consist of your child taking a basic skills mathematics, academic self-concept, and a locus of control pretest. Then the students will be randomly assigned to an experimental and a control group. The students in the control group will participate in 12 weeks, 60 minutes a day of supervised IMTS remedial instruction. The students in the experimental group will participate in 12 weeks, 50 minutes per day of IMTS instruction plus a 10-minute daily period of CAI.

In order for your child to participate in the research study, you must sign and return the permission form provided below by Thursday, January 7. Please be certain to return the permission slip whether or not you wish your child to take part. Participation is voluntary and may be terminated at any time. Participation will be determined on a first come, first serve basis as there are a limited number of places in the program.

If you have any questions concerning the study, I will be happy to answer them for you. You may reach me by calling 764-9521 during the day or 272-0161 day or evening.

Thank you for your cooperation. I look forward to working with your children in this research study.

Sincerely,

Gary L. Reglin

Please respond and return this form by Thursday, January 7, 1988.

Please check and write your child's name below.

_____ Yes, I give permission for ______________________________ to participate in the computer study. I understand that I may call to discuss questions and concerns I may have about the study. I understand that this study has been approved by the Duval Public Schools and the study will be carried out by Gary L. Reglin. I understand that my child's test scores will not be revealed, and that all data will remain confidential. Finally, I understand that I may withdraw my consent and discontinue my child's participation at any time.

_____ No, I do not wish my child ______________________________ to participate in this study.

____
Parent Signature

____
Date

APPENDIX B
PERMISSION LETTERS FROM PRINCIPAL AND DISTRICT
TO CONDUCT STUDY

A. PHILIP RANDOLPH

NATHANIEL L. DAVIS
PRINCIPAL

John Morrison
VICE-PRINCIPAL

Northside Skills Center #285
1157 Golfair Boulevard
Jacksonville, Florida 32209
(904) 764-9521

TO: Mr. John Morrison
Mr. Gary Reglin
Mrs. Jean Waring

FROM: Nathaniel L. Davis
Principal

IN RE: CCC - COMPUTER ASSISTED INSTRUCTION PROGRAM STUDY PROPOSAL

DATE: December 2, 1987

Please read through the attached memo and note dates of action. Your execution of the requested assistance is endorsed by me. Gary Reglin will be in charge of conducting and supervising the program study at Northside Skills Center IMTS laboratory.

NLD:jsc

RECEIVED
OFFICE OF PRINCIPAL
A.P.R. NORTHSIDE SKILLS CENTER

DEC 1 1987

REFERRED TO ____________
DATE REFERRED ____________

MEMORANDUM

TO: Mr. Nathaniel Davis
Principal, Philip A. Randolph Skills Center

FROM: John O. Gillespie, Assistant Superintendent
Division of Administration and Instructional Auditing

Charles H. Cline, Assistant Superintendent
Division of Instruction

SUBJECT: CCC - COMPUTER ASSISTED INSTRUCTION PROGRAM - STUDY PROPOSAL

DATE: November 30, 1987

Development and implementation of regional skills centers has enabled the school district to meet many student educational needs that previously went unmet. The varied and timely course offerings of the centers have provided many students with valuable knowledge and skills needed to obtain gainful employment both before and after graduation. This multi-faceted approach to education lends itself to addi ion of new programs to aid students with special educational needs. One such program recently implemented in the skills centers is the CCC Computer Assisted Instruction Program. Initial observations indicate the program provides quality instruction in both basic skill and elective areas. Instruction provided through the program appears to be delivered in a fashion that will enhance student self-perception and internal motivation. Therefore, it is plausible that participation in the program will not only improve the educational performance of participants, but will promote reentry into school by participants who previously dropped out of school.

With the foregoing in mind, a study has been designed to examine the CCC program and attempt to assay its influence on students. Such a study will not only provide us with insight into how the program influences student performance, but will also provide information that will aid you in meeting special educational needs of your students. The study, though, can only be conducted if we have your permission and assistance.

Page 2
CCC - COMPUTER ASSISTED INSTRUCTION PROGRAM -
STUDY PROPOSAL
November 30, 1987

Details regarding the proposed study are provided on the attached study proposal. Please read the proposal and consider participating in the study. Dr. Logan Cross or your FTVTP Specialist will be in contact with you to answer any questions you have about the proposed study and determine if we have permission to conduct the study in your school.

JOG/JLC/tsd

Enclosure

cc: Area Assistant Superintendents
John Holechek
Paula Potter
Beverly Shields

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Gary L. Reglin was born in Quincy, Florida, where he graduated from Carter Parramore High School in 1968. In 1969 he enlisted in the United States Navy and worked as an aviation electrician. He received a Bachelor of Science degree in physics and mathematics from Southern University in Baton Rouge, Louisiana, in 1975 and a commission as a submarine naval officer. In 1979 he received a Master of Arts degree in business administration from Webster College in St. Louis, Missouri. It was during his employment as Executive Officer of the Navy Reserve Center in Jacksonville, Florida, that he began work on his doctorate at the University of Florida. He left active duty in the Navy in December, 1985, affiliated with the naval reserves, and began to devote more time to pursuing his doctorate. For the past 3 years, he has been chairman of the Individualized Manpower Training System at Northside Skills Center in Duval County. He plans on resuming his career as an active duty naval officer coordinating educational programs.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

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Associate Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

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